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FIG.1

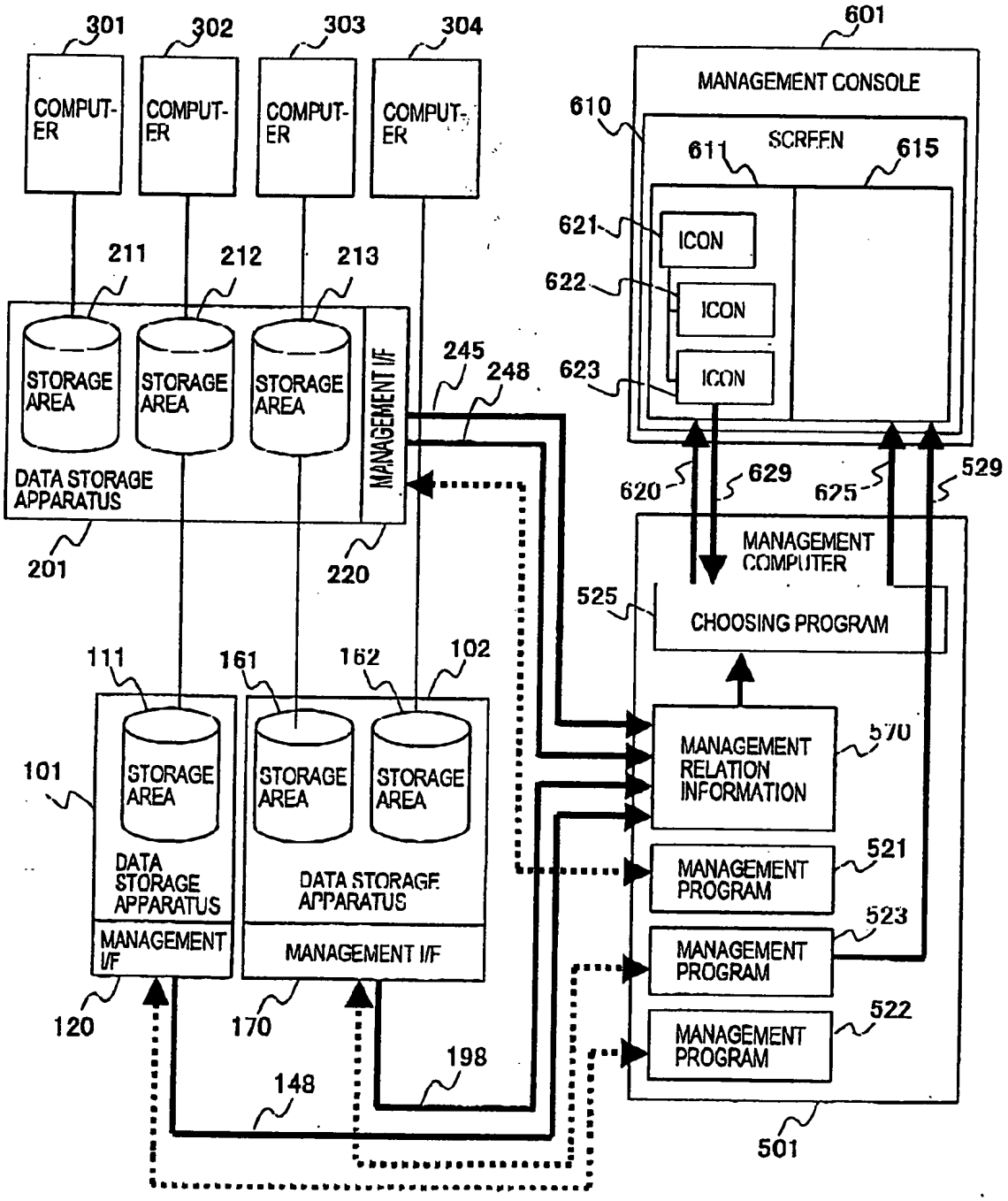
301
302
303
304
COMPUT-ER
COMPUT-ER
COMPUT-ER
COMPUT-ER
601
MANAGEMENT CONSOLE
610
611
SCREEN
615
621
ICON
622
ICON
623
ICON
211
212
213
STORAGE AREA
STORAGE AREA
STORAGE AREA
MANAGEMENT I/F
245
248
DATA STORAGE APPARATUS
201
220
620
629
625
529
MANAGEMENT COMPUTER
525
CHOOSING PROGRAM
111
161
162
102
101
STORAGE AREA
STORAGE AREA
STORAGE AREA
DATA STORAGE APPARATUS
DATA STORAGE APPARATUS
MANAGEMENT I/F
MANAGEMENT I/F
MANAGEMENT RELATION INFORMATION
570
MANAGEMENT PROGRAM
521
MANAGEMENT PROGRAM
523
MANAGEMENT PROGRAM
522
120
170
198
148
501

FIG.2

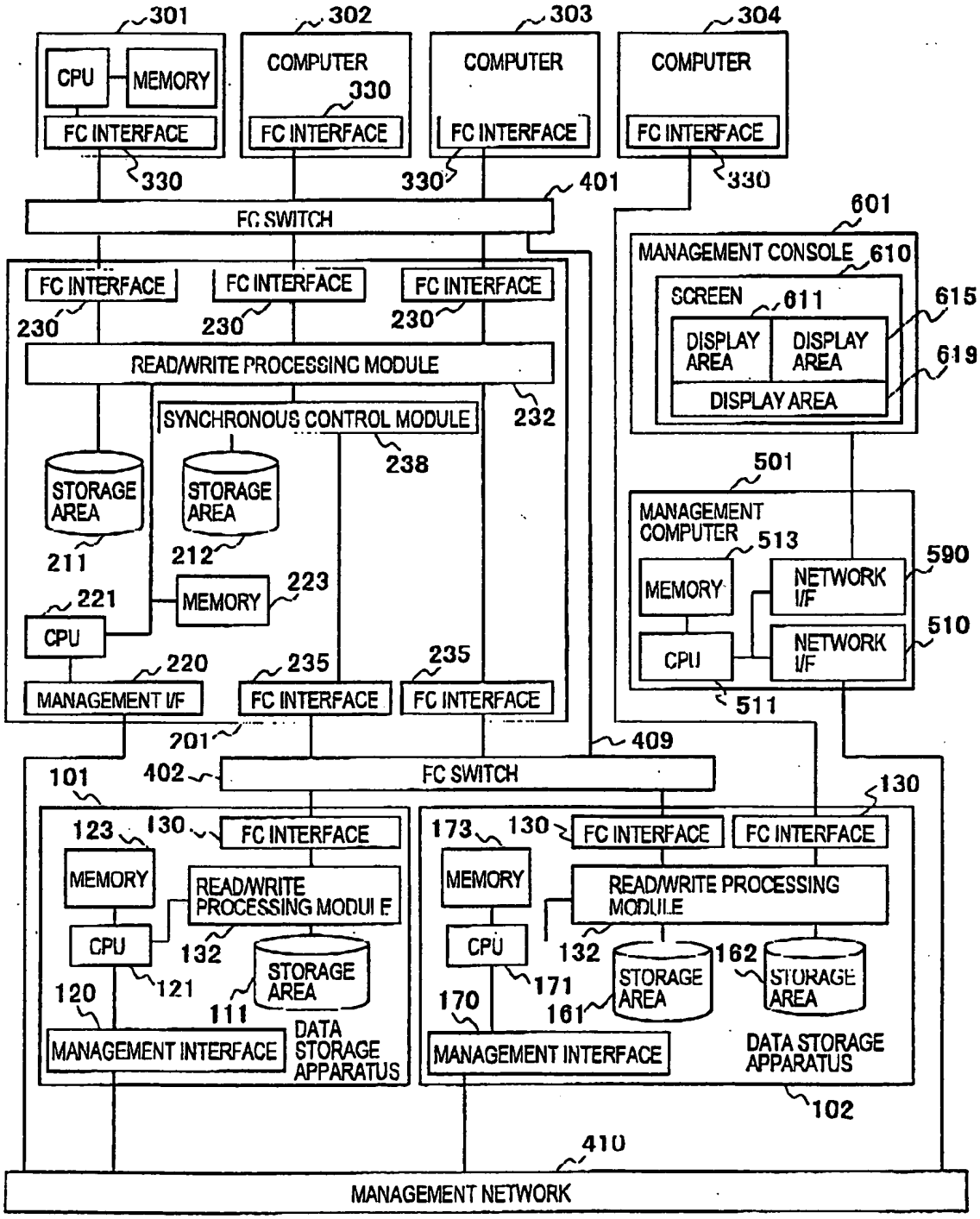
301
302
303
304
CPU
MEMORY
FC INTERFACE
COMPUTER
330
401
601
FC SWITCH
MANAGEMENT CONSOLE
610
SCREEN
611
615
DISPLAY AREA
619
230
READ/WRITE PROCESSING MODULE
232
SYNCHRONOUS CONTROL MODULE
238
STORAGE AREA
211
212
501
MANAGEMENT COMPUTER
513
590
NETWORK I/F
510
221
223
220
235
MANAGEMENT I/F
201
409
402
511
101
130
123
173
READ/WRITE PROCESSING MODULE
132
121
120
111
162
171
161
170
DATA STORAGE APPARATUS
102
410
MANAGEMENT NETWORK

FIG.3

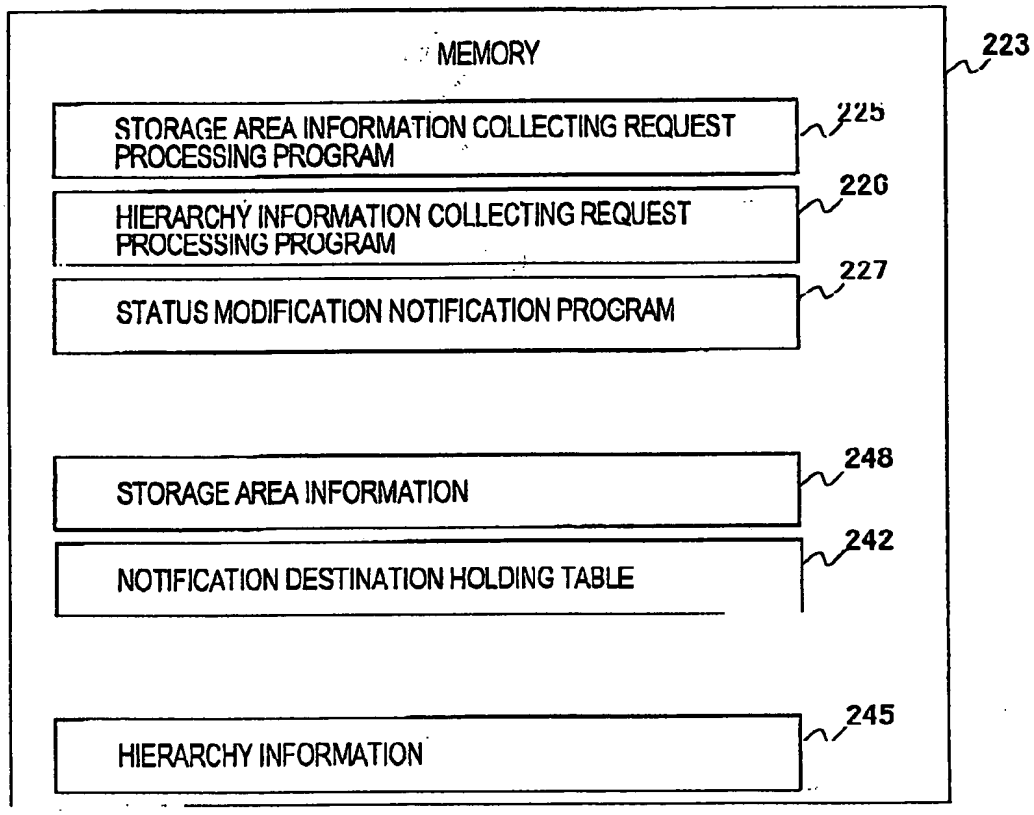
MEMORY
223
STORAGE AREA INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
225
HIERARCHY INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
226
STATUS MODIFICATION NOTIFICATION PROGRAM
227
STORAGE AREA INFORMATION
248
NOTIFICATION DESTINATION HOLDING TABLE
242
HIERARCHY INFORMATION
245

FIG.4A

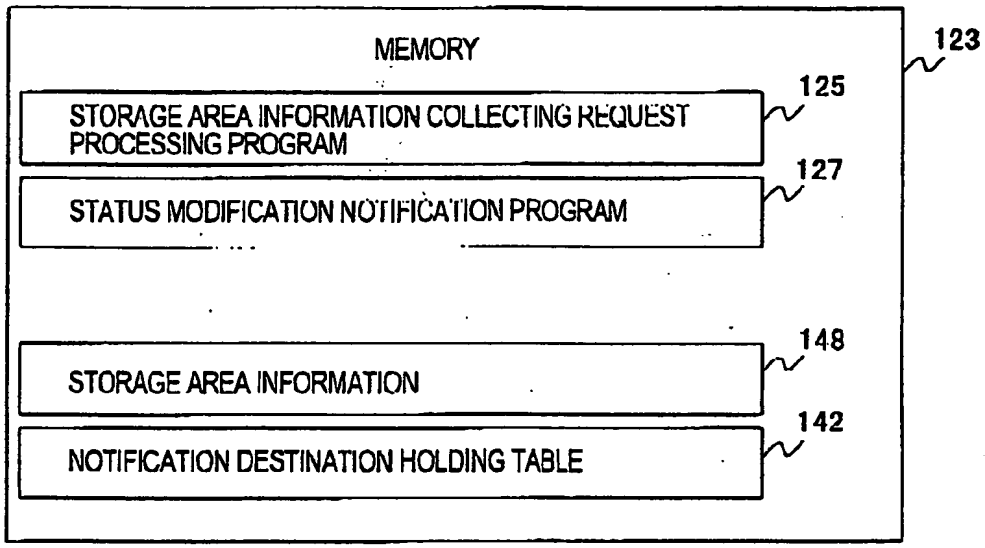
MEMORY
123
STORAGE AREA INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
125
STATUS MODIFICATION NOTIFICATION PROGRAM
127
STORAGE AREA INFORMATION
148
NOTIFICATION DESTINATION HOLDING TABLE
142

FIG.4B

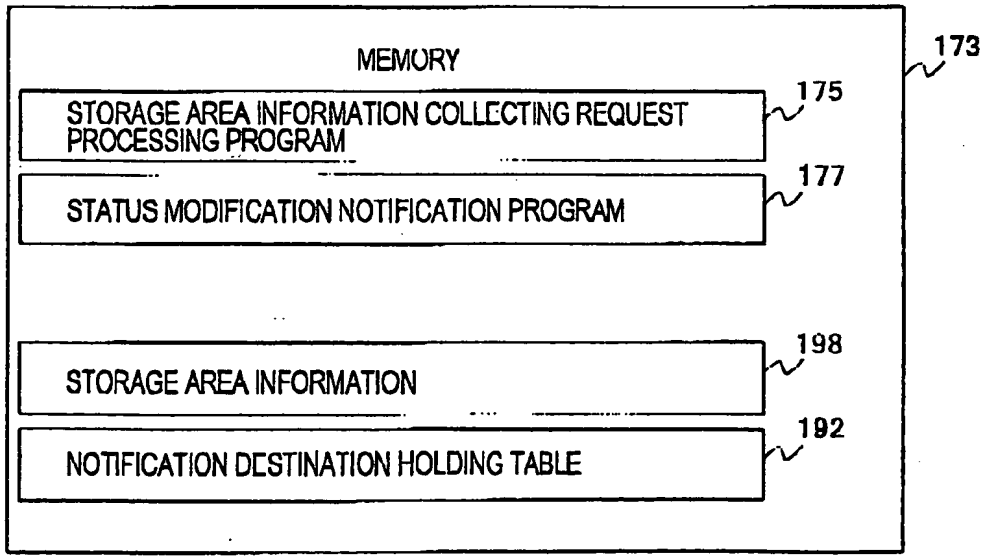
MEMORY
173
STORAGE AREA INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
175
STATUS MODIFICATION NOTIFICATION PROGRAM
177
STORAGE AREA INFORMATION
198
NOTIFICATION DESTINATION HOLDING TABLE
192

FIG.5

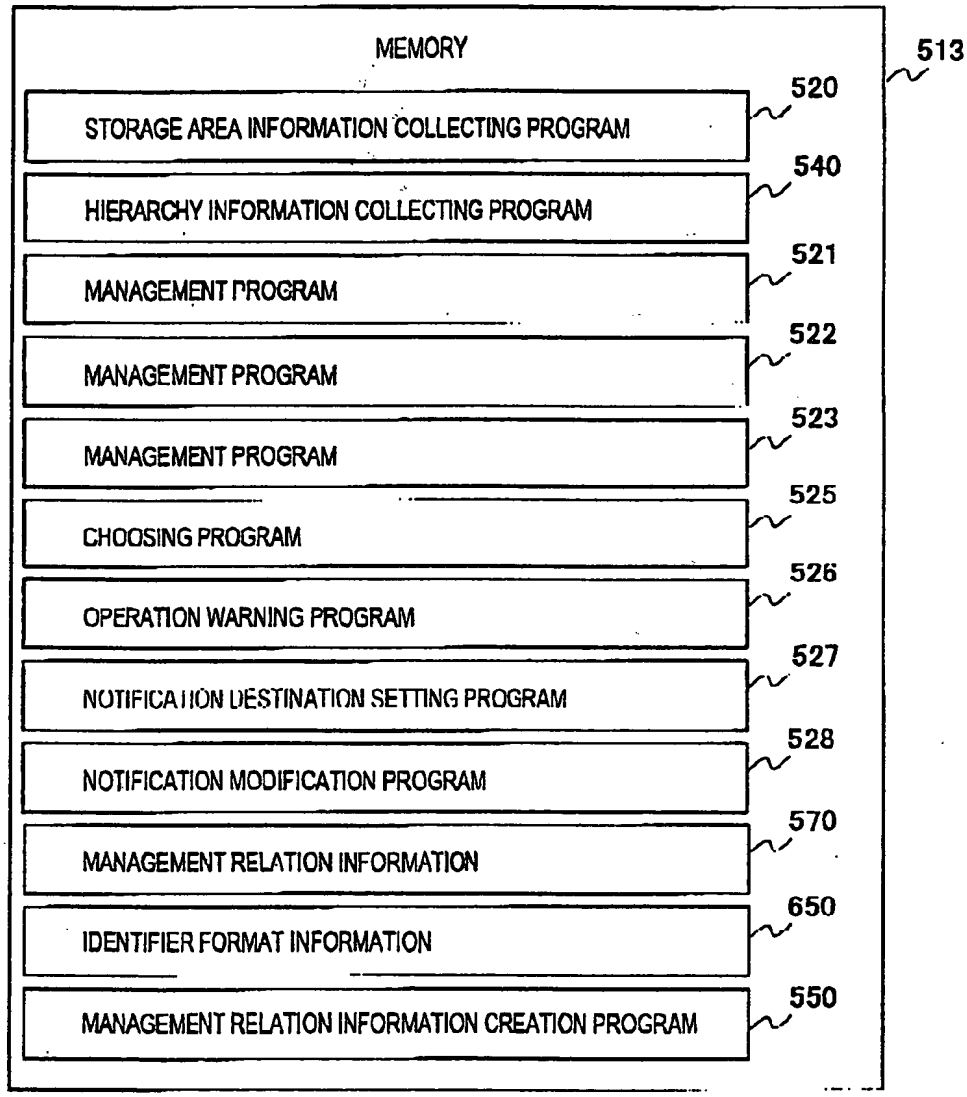
MEMORY
513
STORAGE AREA INFORMATION COLLECTING PROGRAM
520
HIERARCHY INFORMATION COLLECTING PROGRAM
540
MANAGEMENT PROGRAM
521
MANAGEMENT PROGRAM
522
MANAGEMENT PROGRAM
523
CHOOSING PROGRAM
525
OPERATION WARNING PROGRAM
526
NOTIFICATION DESTINATION SETTING PROGRAM
527
NOTIFICATION MODIFICATION PROGRAM
528
MANAGEMENT RELATION INFORMATION
570
IDENTIFIER FORMAT INFORMATION
650
MANAGEMENT RELATION INFORMATION CREATION PROGRAM
550

FIG.6

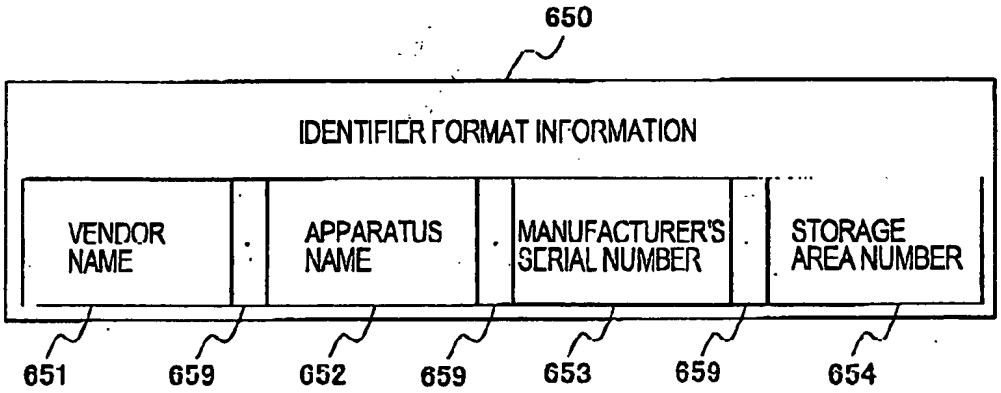
650
IDENTIFIER FORMAT INFORMATION
VENDOR NAME
APPARATUS NAME
MANUFACTURER'S SERIAL NUMBER
STORAGE AREA NUMBER
651
659
652
659
653
659
654

FIG.7A

248

248a TOTAL STORAGE AREA NUMBER	248b MANAGEMENT I/F IDENTIFICATION NUMBER	248c IDENTIFIER	248d CAPACITY
3	220	ABC. XX200. 0123. 211	100GB
		ABC. XX200. 0123. 212	100GB
		ABC. XX200. 0123. 213	100GB

FIG.7B

140

148a TOTAL STORAGE AREA NUMBER	148b MANAGEMENT I/F IDENTIFICATION NUMBER	148c IDENTIFIER	148d CAPACITY
1	120	DEF. YY100. 0456. 111	100GB

FIG.7C

198

198a TOTAL STORAGE AREA NUMBER	198b MANAGEMENT I/F IDENTIFICATION NUMBER	198c IDENTIFIER	198d CAPACITY
2	170	GHI. ZZ100. 0789. 161	100GB
		GHI. ZZ100. 0789. 162	100GB

FIG.8

245

245a TOTAL STORAGE AREA NUMBER	245b IDENTIFIER	245c CAPACITY	245d LOWER STORAGE AREA EXISTENCE FLAG	245e IDENTIFIER	245f CAPACITY
3	ABC. XX200. 0123. 211	100GB	0		
	ABC. XX200. 0123. 212	100GB	1	DEF. YY100. 0456. 11	100GB
	ABC. XX200. 0123. 213	100GB	2	GHI. ZZ100. 0789. 161	100GB

FIG.9

570

5701					5702				
UPPER DATA STORAGE APPARATUS					LOWER DATA STORAGE APPARATUS				
DATA STORAGE AREA NUMBER (5701a)	MANAGEMENT I/F IDENTIFICATION NUMBER (5701b)	MANAGEMENT PROGRAM IDENTIFICATION NUMBER	ICON NUMBER (5701c)	IDENTIFIER (5701d)	ICON (5702a)	MANAGEMENT I/F IDENTIFICATION NUMBER (5702b)	MANAGEMENT PROGRAM IDENTIFICATION NUMBER (5702c)	ICON NUMBER (5702d)	IDENTIFIER (5702e)
201	220	521	621	ABC . XX200 . 0123	101	120	522	622	GHI . ZZ100 . 0789
					102	170	523	623	DEF . YY100 . 0456

FIG.10

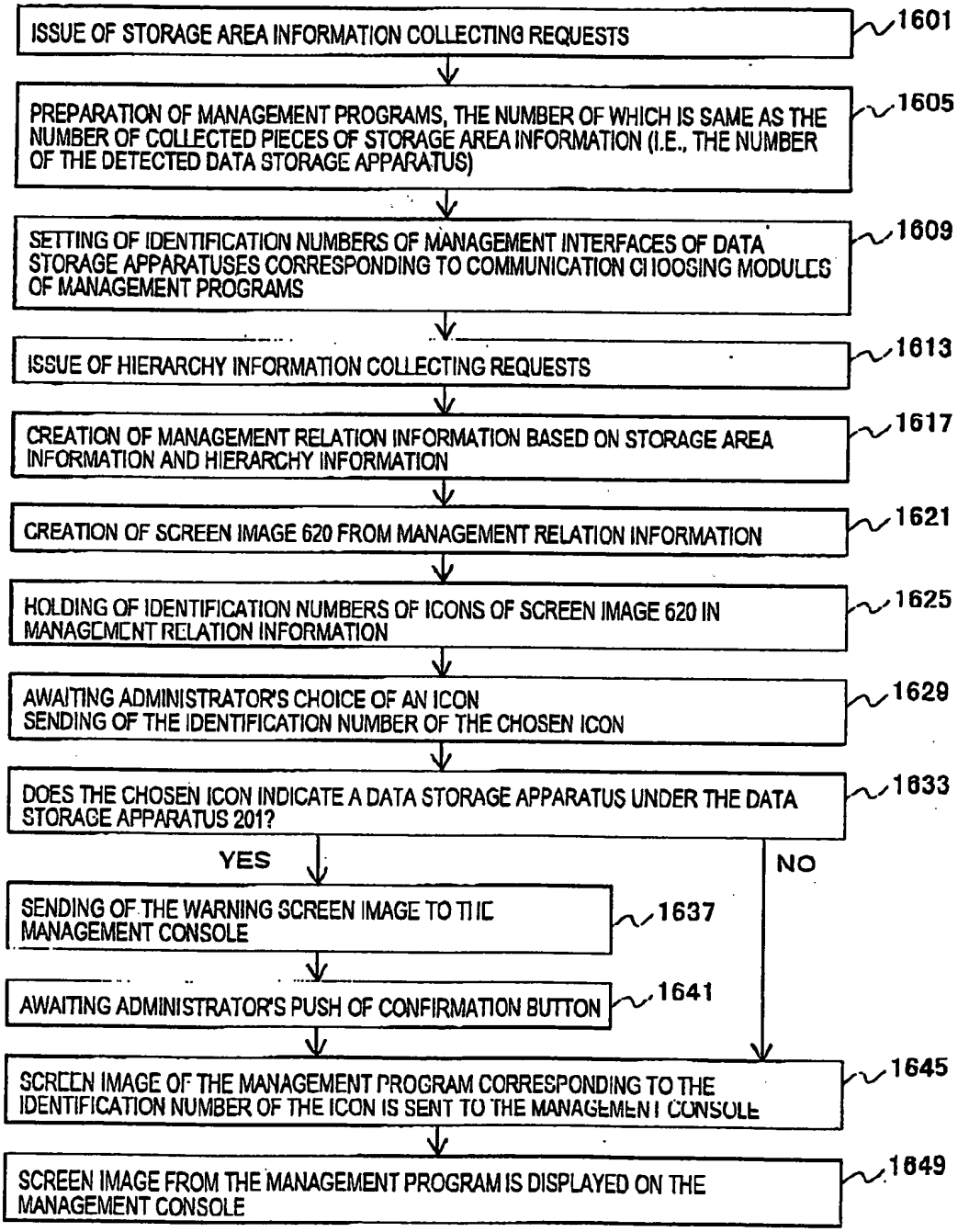
ISSUE OF STORAGE AREA INFORMATION COLLECTING REQUESTS
1601
PREPARATION OF MANAGEMENT PROGRAMS, THE NUMBER OF WHICH IS SAME AS THE NUMBER OF COLLECTED PIECES OF STORAGE AREA INFORMATION (I.E., THE NUMBER OF THE DETECTED DATA STORAGE APPARATUS)
1605
SETTING OF IDENTIFICATION NUMBERS OF MANAGEMENT INTERFACES OF DATA STORAGE APPARATUSES CORRESPONDING TO COMMUNICATION CHOOSING MODULES OF MANAGEMENT PROGRAMS
1609
ISSUE OF HIERARCHY INFORMATION COLLECTING REQUESTS
1613
CREATION OF MANAGEMENT RELATION INFORMATION BASED ON STORAGE AREA INFORMATION AND HIERARCHY INFORMATION
1617
CREATION OF SCREEN IMAGE 620 FROM MANAGEMENT RELATION INFORMATION
1621
HOLDING OF IDENTIFICATION NUMBERS OF ICONS OF SCREEN IMAGE 620 IN MANAGEMENT RELATION INFORMATION
1625
AWAITING ADMINISTRATOR'S CHOICE OF AN ICON
SENDING OF THE IDENTIFICATION NUMBER OF THE CHOSEN ICON
1629
DOES THE CHOSEN ICON INDICATE A DATA STORAGE APPARATUS UNDER THE DATA STORAGE APPARATUS 201?
1633
YES
NO
SENDING OF THE WARNING SCREEN IMAGE TO THE MANAGEMENT CONSOLE
1637
AWAITING ADMINISTRATOR'S PUSH OF CONFIRMATION BUTTON
1641
SCREEN IMAGE OF THE MANAGEMENT PROGRAM CORRESPONDING TO THE IDENTIFICATION NUMBER OF THE ICON IS SENT TO THE MANAGEMENT CONSOLE
1645
SCREEN IMAGE FROM THE MANAGEMENT PROGRAM IS DISPLAYED ON THE MANAGEMENT CONSOLE
1649

FIG.11

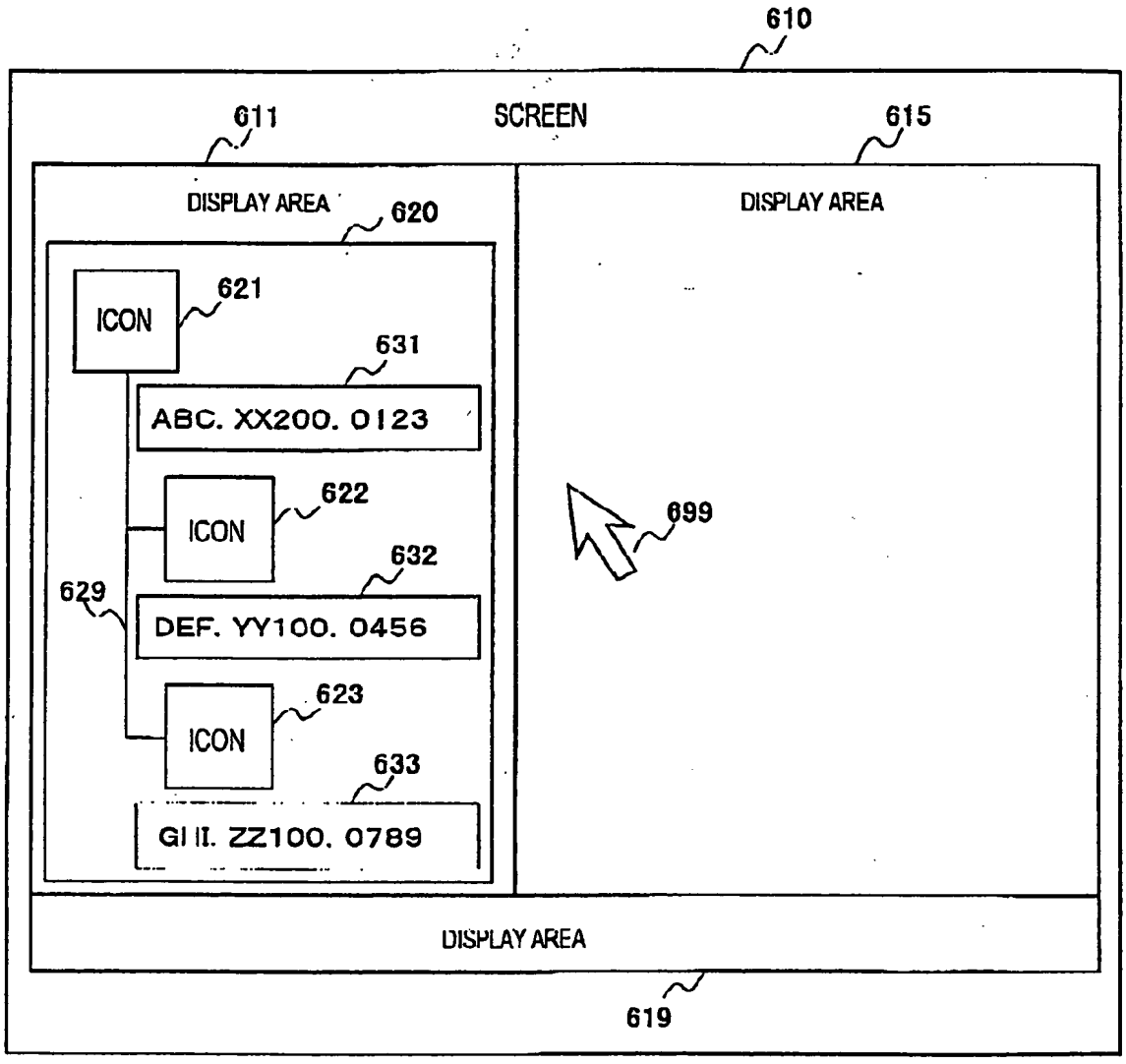
610
611
SCREEN
615
DISPLAY AREA
620
DISPLAY AREA
ICON
621
631
ABC. XX200. 0123
ICON
622
699
632
629
DEF. YY100. 0456
ICON
623
633
GHI. ZZ100. 0789
DISPLAY AREA
619

FIG.12

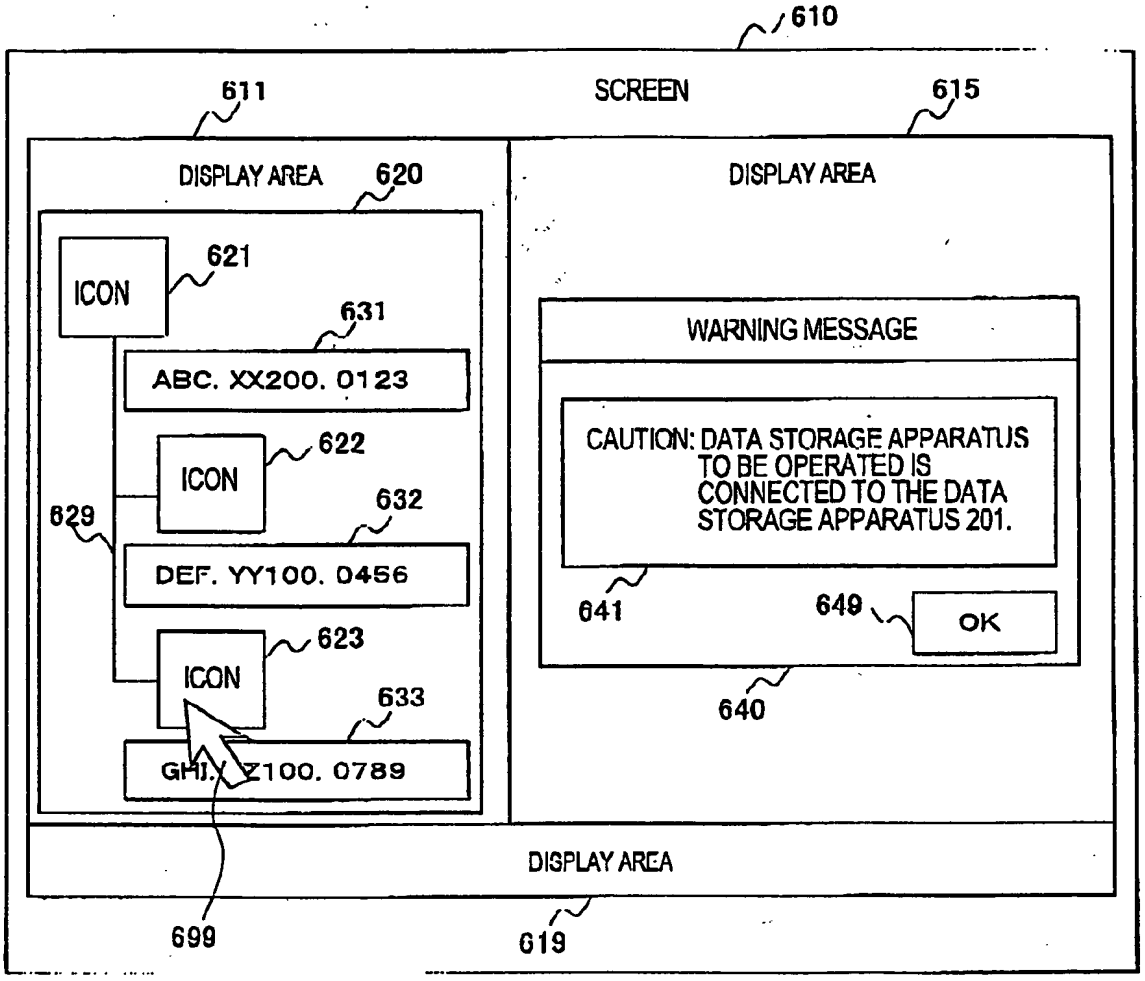
610
611
SCREEN
615
DISPLAY AREA
620
DISPLAY AREA
ICON
621
631
ABC. XX200. 0123
ICON
622
632
629
DEF. YY100. 0456
ICON
623
633
GHI. ZZ100. 0789
699
WARNING MESSAGE
CAUTION: DATA STORAGE APPARATUS TO BE OPERATED IS CONNECTED TO THE DATA STORAGE APPARATUS 201.
641
649
OK
640
DISPLAY AREA
619

FIG.13

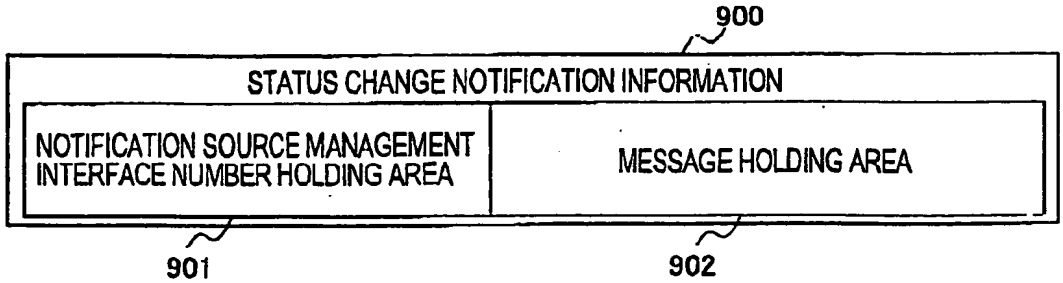
900
STATUS CHANGE NOTIFICATION INFORMATION
NOTIFICATION SOURCE MANAGEMENT INTERFACE NUMBER HOLDING AREA
MESSAGE HOLDING AREA
901
902

FIG.14

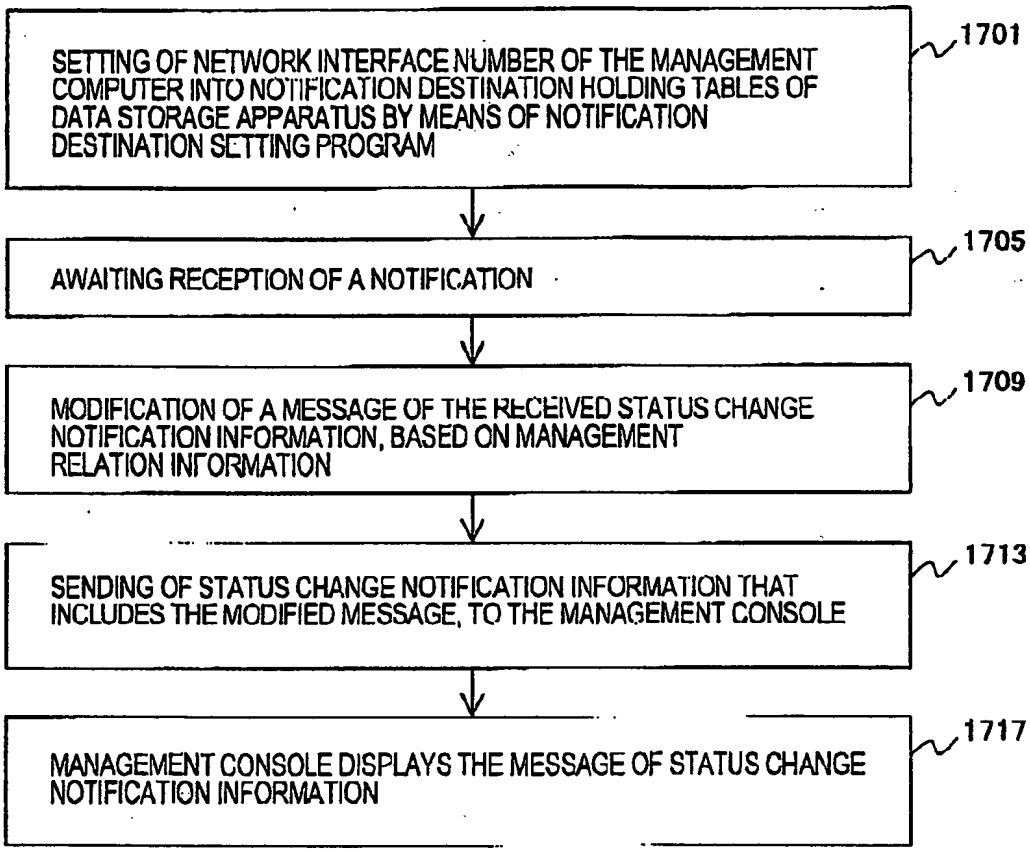
SETTING OF NETWORK INTERFACE NUMBER OF THE MANAGEMENT COMPUTER INTO NOTIFICATION DESTINATION HOLDING TABLES OF DATA STORAGE APPARATUS BY MEANS OF NOTIFICATION DESTINATION SETTING PROGRAM
1701
AWAITING RECEPTION OF A NOTIFICATION
1705
MODIFICATION OF A MESSAGE OF THE RECEIVED STATUS CHANGE NOTIFICATION INFORMATION, BASED ON MANAGEMENT RELATION INFORMATION
1709
SENDING OF STATUS CHANGE NOTIFICATION INFORMATION THAT INCLUDES THE MODIFIED MESSAGE, TO THE MANAGEMENT CONSOLE
1713
MANAGEMENT CONSOLE DISPLAYS THE MESSAGE OF STATUS CHANGE NOTIFICATION INFORMATION
1717

FIG.15

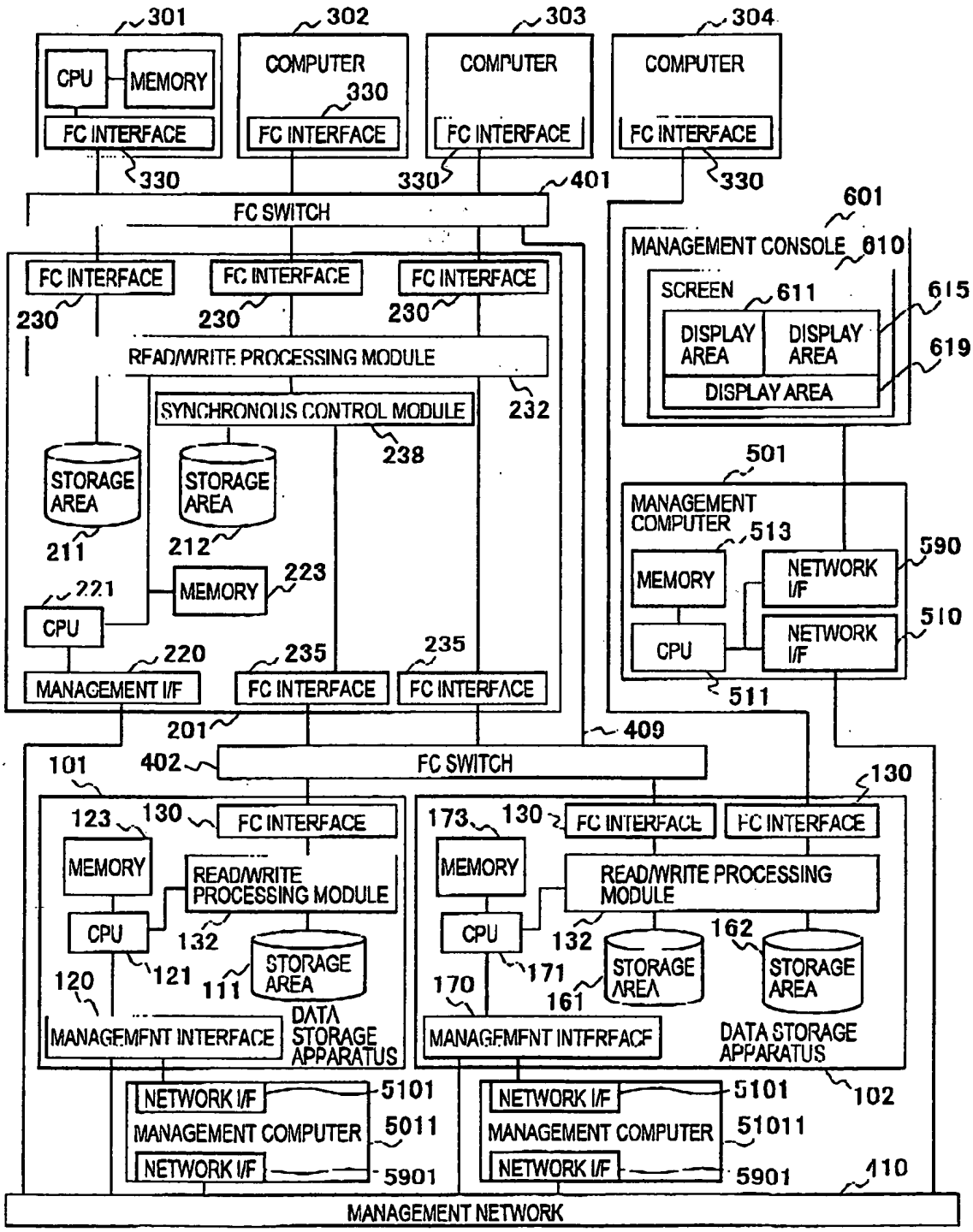
301
302
303
304
CPU
MEMORY
FC INTERFACE
COMPUTER
330
401
601
MANAGEMENT CONSOLE
610
SCREEN
611
615
DISPLAY AREA
619
READ/WRITE PROCESSING MODULE
SYNCHRONOUS CONTROL MODULE
232
238
STORAGE AREA
211
212
501
MANAGEMENT COMPUTER
513
590
NETWORK I/F
510
221
223
220
235
MANAGEMENT I/F
201
409
402
FC SWITCH
101
130
123
READ/WRITE PROCESSING MODULE
132
121
111
120
MANAGEMENT INTERFACE
DATA STORAGE APPARATUS
173
162
170
171
161
102
5101
5011
51011
5901
110
MANAGEMENT NETWORK

FIG.16

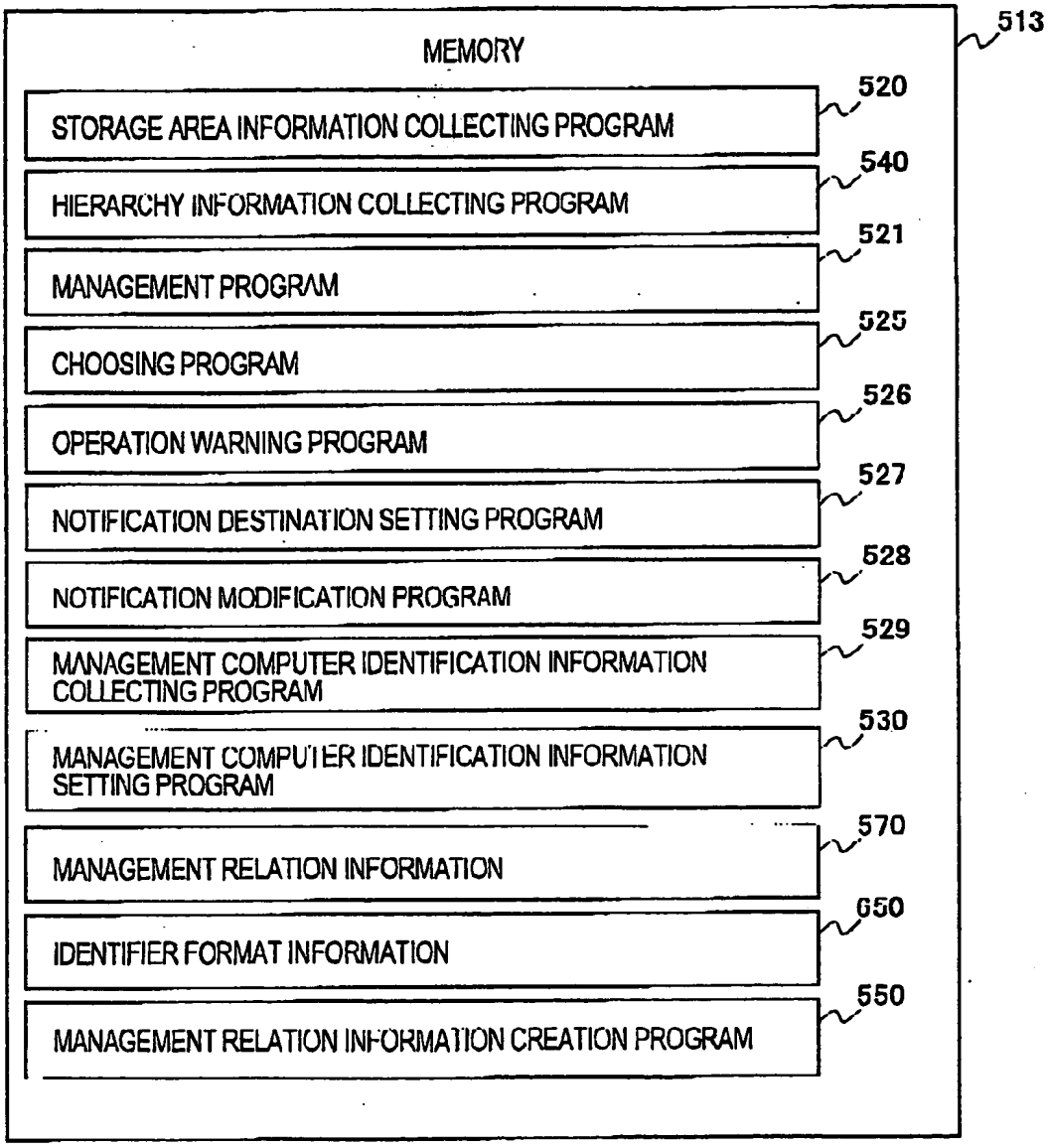
513
MEMORY
520
STORAGE AREA INFORMATION COLLECTING PROGRAM
540
HIERARCHY INFORMATION COLLECTING PROGRAM
521
MANAGEMENT PROGRAM
525
CHOOSING PROGRAM
526
OPERATION WARNING PROGRAM
527
NOTIFICATION DESTINATION SETTING PROGRAM
528
NOTIFICATION MODIFICATION PROGRAM
529
MANAGEMENT COMPUTER IDENTIFICATION INFORMATION COLLECTING PROGRAM
530
MANAGEMENT COMPUTER IDENTIFICATION INFORMATION SETTING PROGRAM
570
MANAGEMENT RELATION INFORMATION
650
IDENTIFIER FORMAT INFORMATION
550
MANAGEMENT RELATION INFORMATION CREATION PROGRAM

FIG.17

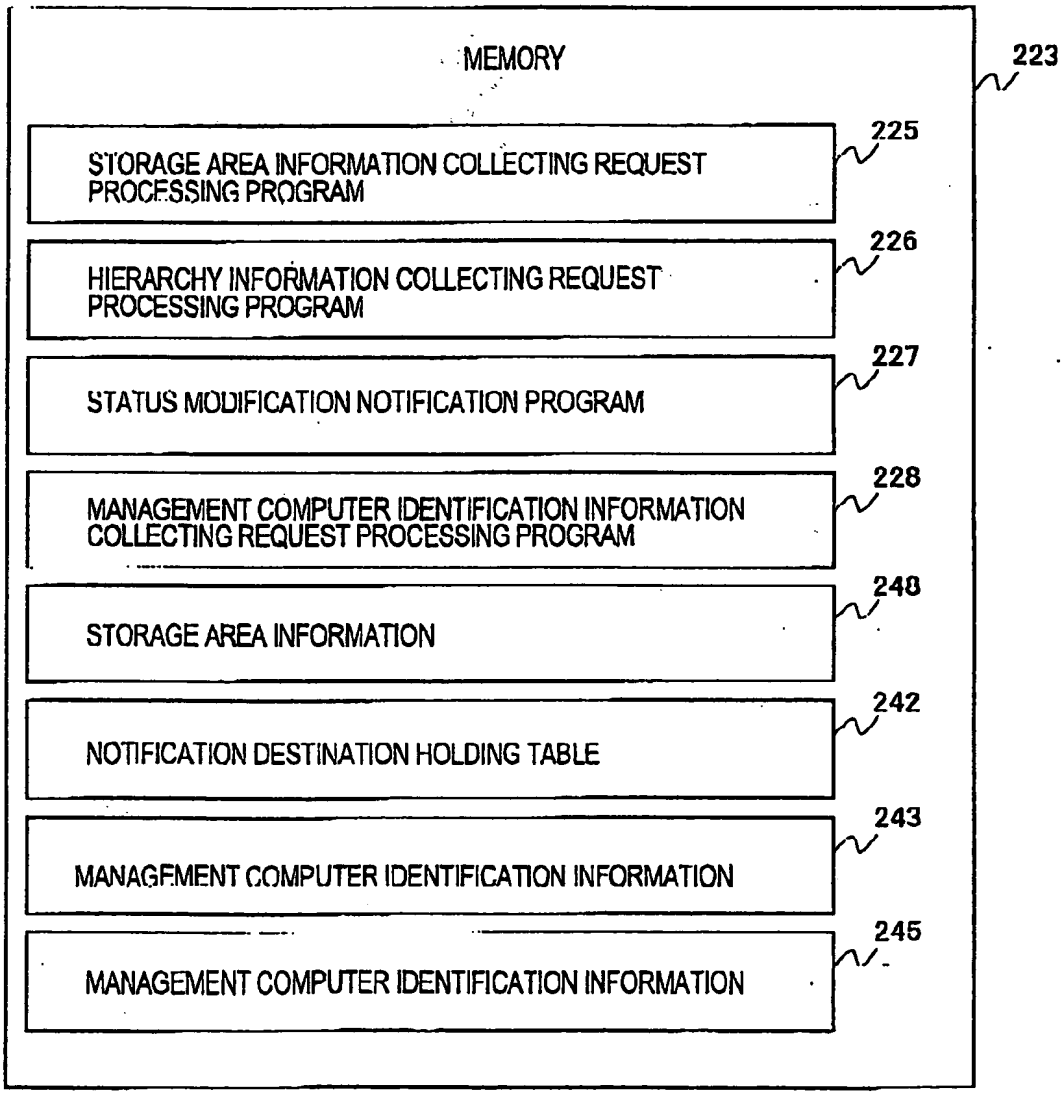
MEMORY
223
STORAGE AREA INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
225
HIERARCHY INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
226
STATUS MODIFICATION NOTIFICATION PROGRAM
227
MANAGEMENT COMPUTER IDENTIFICATION INFORMATION COLLECTING REQUEST PROCESSING PROGRAM
228
STORAGE AREA INFORMATION
240
NOTIFICATION DESTINATION HOLDING TABLE
242
MANAGEMENT COMPUTER IDENTIFICATION INFORMATION
243
MANAGEMENT COMPUTER IDENTIFICATION INFORMATION
245

FIG.18A

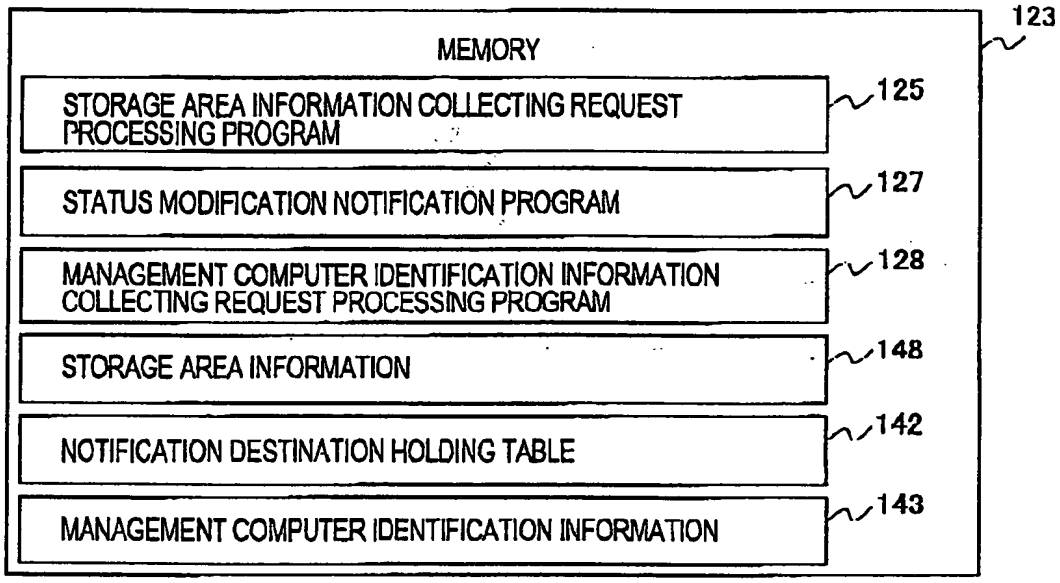

FIG.18B

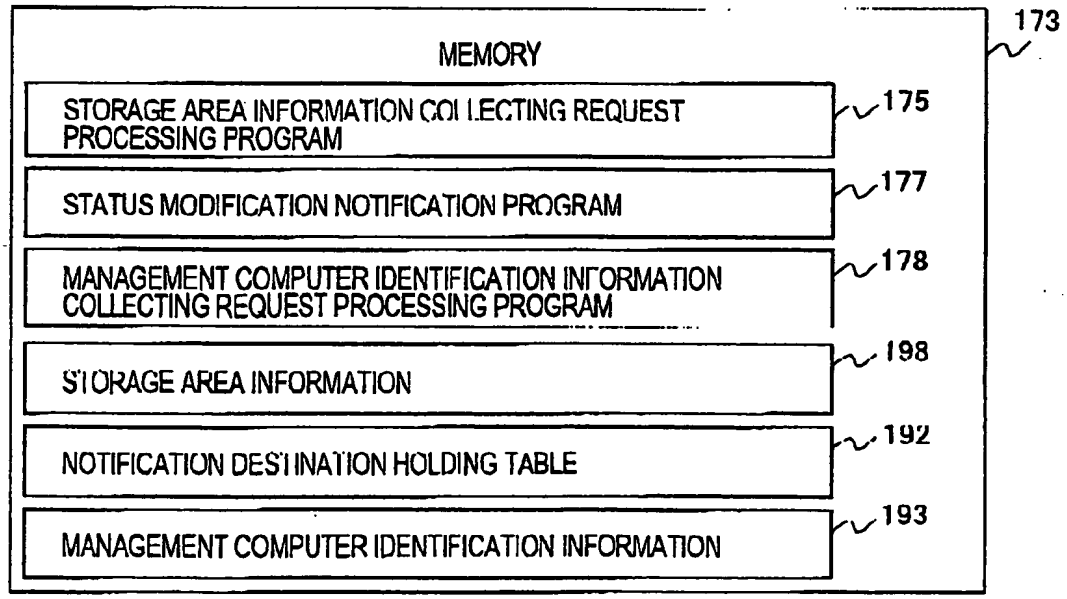

FIG.19A

243

243a FIRST NETWORK INTERFACE NUMBER	243b SECOND NETWORK INTERFACE NUMBER	243c MANAGEMENT PROGRAM NUMBER
0	0	0

FIG.19B

143

143a FIRST NETWORK INTERFACE NUMBER	143b SECOND NETWORK INTERFACE NUMBER	143c MANAGEMENT PROGRAM NUMBER
5101	5901	522

FIG.19C

193

193a FIRST NETWORK INTERFACE NUMBER	193b SECOND NETWORK INTERFACE NUMBER	193c MANAGEMENT PROGRAM NUMBER
5102	5902	523

FIG.19D

243

243a FIRST NETWORK INTERFACE NUMBER	243b SECOND NETWORK INTERFACE NUMBER	243c MANAGEMENT PROGRAM NUMBER
510	590	521

FIG.20

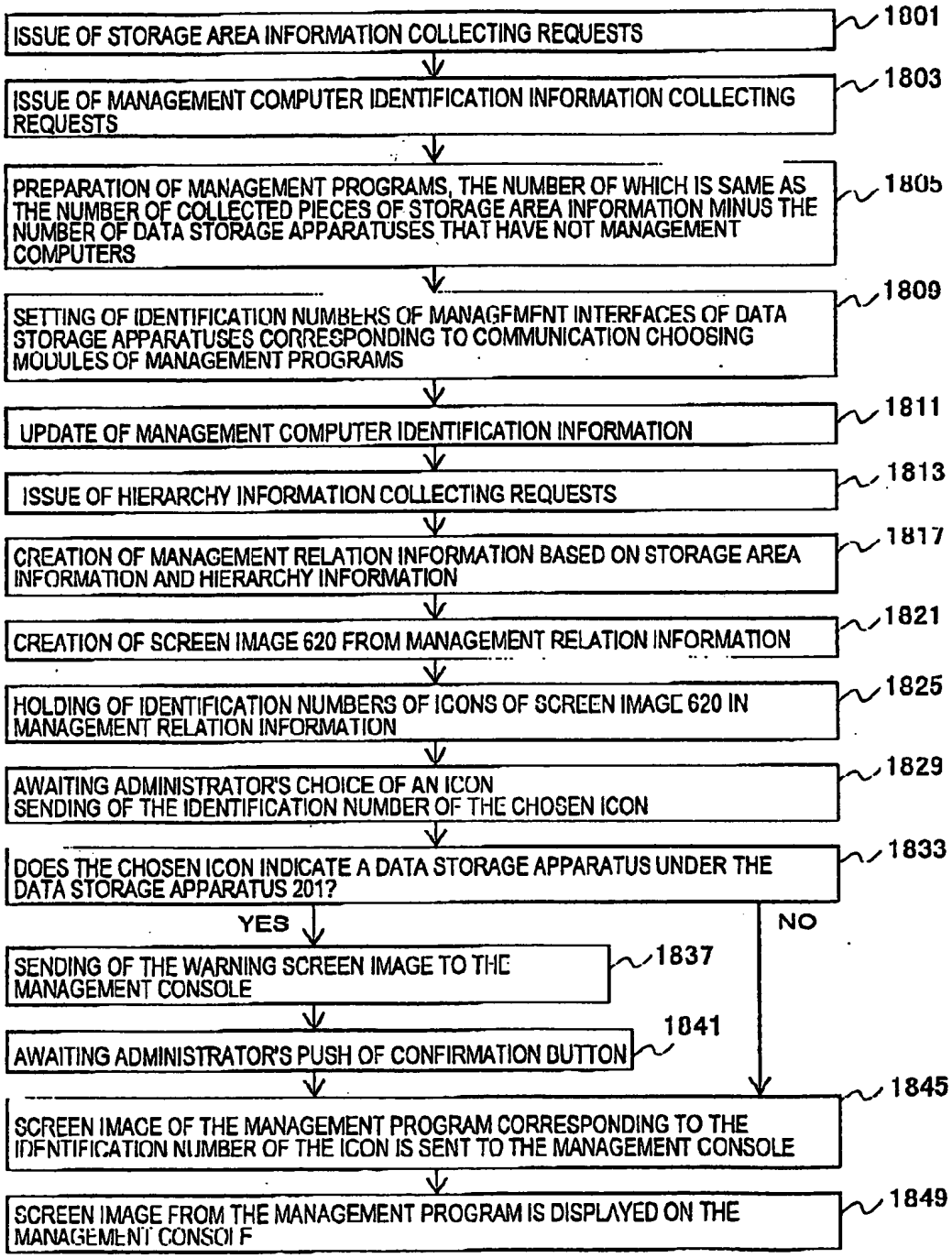
ISSUE OF STORAGE AREA INFORMATION COLLECTING REQUESTS
1801
ISSUE OF MANAGEMENT COMPUTER IDENTIFICATION INFORMATION COLLECTING REQUESTS
1803
PREPARATION OF MANAGEMENT PROGRAMS, THE NUMBER OF WHICH IS SAME AS THE NUMBER OF COLLECTED PIECES OF STORAGE AREA INFORMATION MINUS THE NUMBER OF DATA STORAGE APPARATUSES THAT HAVE NOT MANAGEMENT COMPUTERS
1805
SETTING OF IDENTIFICATION NUMBERS OF MANAGEMENT INTERFACES OF DATA STORAGE APPARATUSES CORRESPONDING TO COMMUNICATION CHOOSING MODULES OF MANAGEMENT PROGRAMS
1809
UPDATE OF MANAGEMENT COMPUTER IDENTIFICATION INFORMATION
1811
ISSUE OF HIERARCHY INFORMATION COLLECTING REQUESTS
1813
CREATION OF MANAGEMENT RELATION INFORMATION BASED ON STORAGE AREA INFORMATION AND HIERARCHY INFORMATION
1817
CREATION OF SCREEN IMAGE 620 FROM MANAGEMENT RELATION INFORMATION
1821
HOLDING OF IDENTIFICATION NUMBERS OF ICONS OF SCREEN IMAGE 620 IN MANAGEMENT RELATION INFORMATION
1825
AWAITING ADMINISTRATOR'S CHOICE OF AN ICON
SENDING OF THE IDENTIFICATION NUMBER OF THE CHOSEN ICON
1829
DOES THE CHOSEN ICON INDICATE A DATA STORAGE APPARATUS UNDER THE DATA STORAGE APPARATUS 201?
1833
YES
NO
SENDING OF THE WARNING SCREEN IMAGE TO THE MANAGEMENT CONSOLE
1837
AWAITING ADMINISTRATOR'S PUSH OF CONFIRMATION BUTTON
1841
SCREEN IMAGE OF THE MANAGEMENT PROGRAM CORRESPONDING TO THE IDENTIFICATION NUMBER OF THE ICON IS SENT TO THE MANAGEMENT CONSOLE
1845
SCREEN IMAGE FROM THE MANAGEMENT PROGRAM IS DISPLAYED ON THE MANAGEMENT CONSOLE
1849

FIG.21

580

5801						5802					
5801a	5801b	5801c	5801d	5801e	5801f	5802a	5802b	5802c	5802d	5802e	5802f
UPPER DATA STORAGE APPARATUS						LOWER DATA STORAGE APPARATUS					
DATA STORAGE AREA NUMBER	MANAGEMENT I/F IDENTIFICATION NUMBER	MANAGEMENT PROGRAM IDENTIFICATION NUMBER	ICON NUMBER	IDENTIFIER	MANAGEMENT DEVICE NUMBER	DATA STORAGE AREA NUMBER	MANAGEMENT I/F IDENTIFICATION NUMBER	MANAGEMENT PROGRAM IDENTIFICATION NUMBER	ICON NUMBER	IDENTIFIER	MANAGEMENT DEVICE NUMBER
201	220	521	621	ABC . XX200 . 0123	220	101	5901	522	622	GHI . ZZ100 . 0789	5901
						102	5902	523	623	DEF . YY100 . 0456	5902